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METHOD OF PRODUCING COBALT HYDROXIDE  
[SPOSOB POLUCHENIYA GIDRATA ZAKISI KOBAL'TA]

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## Method of producing cobalt hydroxide

### Abstract

The invention pertains to a method of producing cobalt hydroxide and has applications in the chemical industry.

A method is known for producing cobalt hydroxide that includes the interaction of a cobalt salt solution that contains about 1% glucose, with sodium hydroxide, washing first with a mixture of alcohol with water, then with a mixture of acetone with water and, finally, with pure acetone and drying of the precipitate of the end product [1].

A method for producing cobalt hydroxide that includes the interaction of cobalt nitrate with sodium hydroxide with heating, separation of the precipitate product, its washing and drying is known [2].

A deficiency of this method is that it contains a significant quantity of impurities in the product: thus, the  $\text{Co}^{3+}$  content is 1-5%, total nitrogen (N) is 0.2%, sulfates ( $\text{SO}_4$ ) is 0.02%, chlorides (Cl) is 0.01%, and another shortcoming is that the interaction process is carried out with heating.

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<sup>1</sup> Numbers in the margin indicate pagination in the foreign text.

The aim of the invention is to reduce the impurity content in the product and to assure the possibility of carrying out the interaction process at normal temperature.

This can be achieved by using as the starting compound cobalt carbonate of the basic cobalt.

The interaction process of the starting reagents is best conducted at 18-25°C.

A 10% solution of alkali with 20% excessive amount compared to the stoichiometric ratio is supplied for the interaction with basic cobalt carbonate.

The synthesis and washing of the product are carried out beneath a mother liquor and water layer.

The cobalt hydroxide produced by the indicated method has in its composition in percentages:

Co <sup>2+</sup>	61.4-62
Co <sup>3+</sup>	0.2-0.3
Total nitrogen	0.001
Sulfates	0.001
Chlorine	0.001
Carbonate	0.2-0.4

The derived produced can be used in the storage battery industry.

Example. One pours 300-350 l of distilled water into a 400 liter stainless steel container and adds a load of 100 kg of caustic soda with stirring. The solution is left to settle for two hours. The settled solution is transferred by a vacuum method to a measuring tank, from which the solution is poured by gravity flow into a 2000 liter enameled apparatus. The solution of alkali is brought with the addition of distilled water to a specific gravity of 1.08-1.1 and cooled to 15-20°C.

270 kg of a basic cobalt carbonate paste containing approximately 30% cobalt or 180 kg of dry product with cobalt content of 45% is loaded into the cooled alkali solution with stirring.

After supplying the basic cobalt carbonate  $m \text{CoCO}_3 \cdot n \text{Co(OH)}_2$  the stirring is immediately stopped and the reaction mass is left for 24 hours. During this time complete decomposition of the basic cobalt carbonate occurs with the formation of cobalt hydroxide. Next the product is washed.

The washing operation is carried out in the same apparatus where the production of  $\text{Co(OH)}_2$  was conducted. By using a rubber hose the mother liquor is drained off, which contains 5%  $\text{Na}_2\text{CO}_3$  and approximately 6%  $\text{NaOH}$ . 700-800 l of distilled water is poured into the apparatus, the stirring rod is activated and the contents of the apparatus are stirred for not more than 1-2 minutes, because the stirring promotes oxidation of the cobalt.

In order to prevent oxidation it is also recommended that one leave the resulting paste of  $\text{Co}(\text{OH})_2$  always beneath the layer of water. After the  $\text{Co}(\text{OH})_2$  settles the rinse water is slowly decanted (especially at first, when there is a high pH), because oxidation of the product occurs in an alkaline medium.

The washing is carried out to a pH of 6-7 based on common litmus paper. A total of 10-13 washings is performed. The washed product is squeezed through a Nutsch filter, and then in a centrifuge. Drying of the hydrate is performed in a SP-30 type drying unit in a fluidized bed. 30-45 kg of centrifuged  $\text{Co}(\text{OH})_2$  is loaded into the drying unit and dried at temperature of 50-60°C for 40-60 minutes. The yield from the operation is 100 kg or 78% with respect to the cobalt.

#### CLAIMS

A method of producing cobalt hydroxide, which includes interaction of a cobalt compound with sodium hydroxide, separation of the product precipitate, its washing and drying, is characterized by the fact that in order to reduce the impurity content in the product and to assure the possibility of conducting the interaction process at normal temperature, basic cobalt carbonate is used as the starting cobalt compound.

Information sources considered by the examining board in its evaluation of the invention:

1. Manual of preparative inorganic chemistry. Edited by G. Brauer, Moscow, 1956, p. 697.

2. Karyakin Yu. V. and I. I. Angelov. Pure chemical substances. 1974, p. 208 (prototype).